

This listing of claims will replace all prior versions of claims in the application:

**Listing of Claims:**

Claims 1-30 (cancelled)

31. (new) A disposable pump unit for receiving and metering a predetermined volume of fluid, the pump comprising a body, the body having a surface at which opens the mouth of a cavity formed in the body, an inlet port for connection with a reservoir of fluid and opening at the body surface adjacent to the mouth of the cavity whereby, when the inlet port is open when the pump is being filled with fluid from the reservoir, fluid can flow from the inlet port into the cavity *via* the mouth thereof, an outlet port for the fluid and opening at the body surface, and a fluid flow passageway extending through the body and connecting the cavity to the outlet port; and flexible membrane means sealingly secured at its periphery to the body surface and having a first portion overlying the cavity and the inlet port and a second portion overlying the outlet port, the flexible membrane means whereat it overlies the inlet and outlet ports being moveable against the ports to close the ports.

32. (new) A disposable pump unit according to claim 31, wherein the first and second portions of the flexible membrane means together comprise an integral flexible membrane.

33. (new) A disposable pump unit according to claim 31, wherein said first and second portions of the flexible membrane means are separate from one another.

34. (new) A disposable pump unit according to claim 31, wherein the first portion of the flexible membrane means is substantially non-stretchable and is pre-formed in part to a shape substantially similar to the shape of a surface of the pump cavity such that, when the pump is operated to pump a metered volume of fluid through the outlet port, the pre-formed part of the flexible membrane means can be urged by an actuating fluid into the pump cavity and into contact with substantially the whole surface of the cavity to force from the cavity and through the passageway and outlet port substantially all of the fluid that flowed from the reservoir into the cavity when the pump was filled.

35. (new) A disposable pump unit according to claim 34, wherein during storage and transportation of the pump the preformed part of the flexible membrane means is adapted to lie flush with the surface of the pump cavity to reduce the susceptibility of the flexible membrane means to damage during transit.

36. (new) A disposable pump unit according to claim 31, wherein the flexible membrane means comprise a laminate flexible film comprising a layer of substantially non-stretchable polymer and a layer of a heat-weldable polymer.

37. (new) A disposable pump unit according to claim 31, wherein the flexible membrane means comprises a layer of polyamide and a layer of polyurethane.

38. (new) A disposable pump unit according to claim 31, including a variable fluid flow restrictor downstream from the cavity.

39. (new) A disposable pump unit according to claim 31, wherein the body includes a plurality of cavities and associated pluralities of inlet ports, outlet ports, passageways and flexible membrane means, the disposable pump unit being adapted to be coupled to a pump actuator that operates the pump unit to fill at least one cavity from the reservoir while simultaneously pumping fluid out of at least one other cavity.

40. (new) A disposable pump unit according to claim 39, including a fluid flow channel interconnecting the outlet ports.

41. (new) A disposable pump unit according to claim 31, wherein the body includes a pair of cavities and associated pairs of inlet ports, outlet ports, passageways and flexible membrane means, the disposable pump unit being adapted to be coupled to a pump actuator that operates the pump unit to fill one cavity from the reservoir while simultaneously pumping fluid out of the other cavity.

42. (new) A disposable pump unit according to claim 34, including a plurality of passageways in the surface of the cavity that communicate with the fluid flow passageway to inhibit, when the pre-formed part of the flexible membrane means is urged by an actuating fluid into the pump cavity, the formation of occluded regions of fluid between the cavity wall and the flexible membrane means, so that the flexible membrane means comes into contact with substantially the whole surface of the cavity to ensure that substantially all of the fluid flowed into the cavity from the reservoir during filling of the pump is forced out of the cavity, thereby to ensure that a substantially repeatable volume of fluid is dispensed or metered from the pump.

43. (new) A disposable pump unit according to claim 42, wherein the plurality of passageways comprise a plurality of grooves.

44. (new) A disposable pump unit according to claim 31, wherein the body further has a chamber, downstream from the outlet port, for being fluid coupled to a source of diluent and having a diluent inlet whereby pumped fluid exiting the outlet port mixes with diluent in the chamber.

45. (new) A disposable pump unit according to claim 44, wherein the body further has a plurality of obstructions in the chamber between the outlet port and the diluent inlet for breaking up of the pumped fluid to aid admixture of the pumped fluid and diluent.

46. (new) A disposable pump unit according to claims 44, wherein the body includes an outlet passageway downstream from the chamber, the outlet passageway including mixing means.

47. (new) A disposable pump unit according to claim 45, wherein the mixing means is a static mixer through which an admixture of pumped fluid and diluent flows.

48. (new) A disposable pump unit according to claim 31, wherein the body inlet port is fluid connected to a disposable reservoir containing fluid to be supplied to the inlet port, so that when the reservoir is empty the combined reservoir and pump unit may be disposed of.

49. (new) A disposable pump according to claim 48, including openable closure means between the disposable pump unit and the reservoir, so that the reservoir and disposable pump unit may be shipped together while preventing flow of fluid from the reservoir into the disposable pump unit.

50. (new) A disposable pump unit according to claim 34, including a reusable pump actuator for being coupled to the disposable pump unit to provide actuating fluid to operate the disposable pump unit, identification means for providing information about the fluid to be pumped, and reader means for reading information provided by

the identification means, so that the operation of the disposable pump unit and pump actuator may be adapted to the information provided by the identification means.

51. (new) A disposable pump unit according to claim 50, wherein the identification means is a radio frequency identification (RDIF) tag.

52. (new) A disposable pump unit according to claim 50, wherein the identification means is an Electro-Erasable-Programmable-Read Only Memory (EEPROM) chip.

53. (new) A disposable pump unit according to claim 39, wherein each inlet port of the plurality of inlet ports is for being fluid coupled to an associated one of a plurality of sources of fluid to be pumped, the body including passage means for fluid coupling together the plurality of outlet ports to provide a common outlet for fluid pumped from the plurality of cavities, so that the disposable pump unit may be operated by the pump actuator to selectively dispense the respective fluids individually or in combination.

54. (new) A disposable pump unit according to claim 34, including a reusable pump actuator releasably coupled to the disposable pump unit body with the first and second portions of the flexible membrane means interposed therebetween, the pump actuator including means for providing positive and negative actuating fluid pressures

on the pre-formed part of the flexible membrane means opposite from the cavity to move the pre-formed part into and out of the body cavity to respectively pump fluid from the cavity and draw fluid into the cavity, and first and second valve means respectively associated with the inlet and outlet ports, each valve means including a valve actuator means for operating the valve means to move adjacent portions of the flexible membrane means against and to allow adjacent portions of the flexible membrane means to move away from the associated inlet and outlet ports to respectively close and open the ports, such that when a negative actuating fluid pressure is provided to the flexible membrane means to move the pre-formed flexible means part out of the cavity the first valve means allows the adjacent portion of the flexible membrane means to move away from and open the inlet port and the second valve means moves the adjacent portion of the flexible membrane means against and closes the outlet port so that fluid may be drawn from a reservoir through the inlet port and into the cavity, and such that when a positive actuating fluid pressure is provided to the flexible membrane means to move the pre-formed part of the flexible membrane means into the cavity the first valve means moves the adjacent portion of the flexible membrane means against and closes the inlet port and the second valve means allows the adjacent portion of the flexible membrane means to move away from and open the outlet port so that fluid is pumped from the cavity and through the outlet port.

55. (new) A disposable pump unit according to claim 54 wherein each valve actuator means includes an axially movable armature.

56. (new) A disposable pump unit according to claim 54, wherein the valve actuator means for the second valve means that is associated with the outlet port includes a stepper motor operable to variably control the size of the opening through the outlet port to provide a variable flow restriction.

57. (new) A disposable pump unit according to claim 55, including seals around the armatures of the valve actuator means.

58. (new) A disposable pump unit according to claim 54, wherein the reusable pump actuator has a body including a surface with a cavity therein, such that when the reusable pump actuator is coupled to the disposable pump unit and negative and positive actuating fluid pressures are provided the pre-formed part of the flexible membrane means moves into and out of the pump actuator cavity such that the pumped volume of fluid is defined on one side by the surface of the pump cavity and on the other side by a surface of the pump actuator cavity.

59. (new) A disposable pump unit according to claim 58, wherein the armature associated with the inlet port extends into a volume defined between the pump actuator cavity and the flexible membrane means of the disposable pump unit.



60. (new) A disposable pump unit according to claim 54, wherein the pump actuator includes means for detecting the presence or absence of fluid in the disposable pump unit body cavity.

61. (new) A disposable pump unit according to claim 60, wherein the detecting means comprises ultrasonic detection means.